PATENT

IN THE U.S. PATENT AND TRADEMARK OFFICE

Appellants:	Hisham S. ABDEL-GHAFFAR
Application No.:	09/764,072
Art Unit:	2115
Filed:	January 19, 2001
Examiner:	Connolly, Mark A.
For:	A METHOD OF DETERMINING A TIME OFFSET ESTIMATE BETWEEN A CENTRAL NODE AND A SECONDARY NODE
Atty Docket No.:	29250-000502/US

Customer Service Window
Randolph Building
401 Dulany Street
Alexandria, VA 22313
Mail Stop Appeal Brief – Patent

Date: October 15, 2007
(the due date, October 13, 2007 was a Saturday)

APPELLANTS' BRIEF ON APPEAL UNDER 37 C.F.R. §41.37

Sir:

In accordance with the provisions of 37 C.F.R. §41.37, and in response to the Notification of Non-Compliant Appeal Brief dated September 13, 2007, Appellants submit the following:

I. REAL PARTY IN INTEREST

The real party in interest in this appeal is Alcatel-Lucent.

II. RELATED APPEALS AND INTERFERENCES

Appeal No. 2006-2544 has been previously decided in relation to the present application. A copy of the Appeals Board's decision is included herewith as Appendix XI – Related Proceedings Appendix in accordance with 37 C.F.R. § 41.37(c)(1)(x).

III. STATUS OF CLAIMS

Claims 1-11 are pending in the application, with claims 1 and 11 being written in independent form.

Claims 1-4 and 7 remain finally rejected under 35 U.S.C. § 102 (b) as being anticipated by Premerlani (US Patent No. 5,958,060).

Claim 11 remains finally rejected under 35 U.S.C. § 103 (a) as being unpatentable over Premerlani.

Claims 5-6 and 8-10 remain finally rejected under 35 U.S.C. § 103 (a) as being unpatentable over Premerlani in view of Thornberg (US Patent No. 5,757,772).

Claims 1-11 are being appealed.

IV. STATUS OF AMENDMENTS

No amendments were requested subsequent to the amendment filed on February 7, 2007. Accordingly, no amendments have been filed after the May 23, 2007 Notice of Appeal.

V. SUMMARY OF CLAIMED SUBJECT MATTER

The claimed invention is directed to a method of determining a time offset estimate between a central node and a secondary node. Clock synchronization is a problem in distributed networks.[1] If different nodes in the distributed network are not synchronized (i.e., timing references at the nodes are not identical), it may be difficult to synchronize both of the nodes to a common reference (e.g., Coordinated Universal Time (UTC)).[2]

The inventors teach a method of determining a time offset estimate between a central node and a secondary node. A periodic timer includes a counter which starts at an initial value (e.g., 0) and counts up at equal increments until the counter reaches a threshold (e.g., 4095), at which point a next increment resets the counter to the initial value, where the resetting of the counter is referred to as a time wraparound.[3] Thus, at any given value of the periodic timer, the

[1] See Page 1, lines 11-12 of the Specification.
[2] See Page 1, lines 13-17 of the Specification.
[3] See Page 3, lines 5-19 of the Specification.

periodic timer will arrive again at the given number after a number of increments or counts equal to the threshold. Periodic timing will now be further discussed with respect to Figure 2.

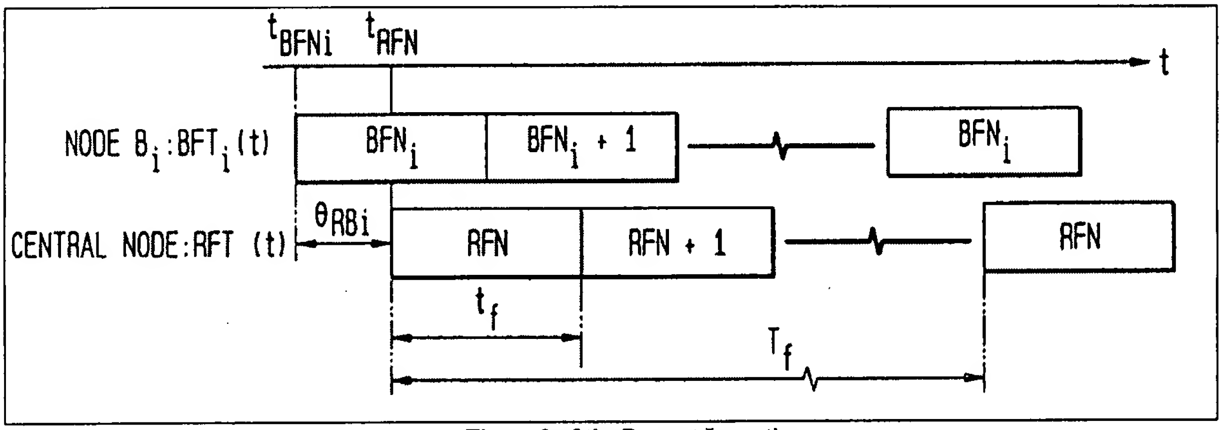

Figure 2 of the Present Invention

In the example embodiment of Figure 2 (reproduced above), the local timings of the central node R and the secondary nodes B_i's are periodic in modulo T_f format and the associated central node Frame Number (RFN) and node B_i Frame Number (BFN_i) are also periodic integers in modulo T_f format (i.e., RFN, BFN_i = 0, 1, ..., 4095 in 3GPP).[4] Accordingly, the central frame node time RFT and the node B_i frame time BFT_i hold to the following expressions:

$RFT\ (t + T_f) = RFT\ (t)$

$BFT_i\ (t + T_f) = BFT_i(t)$[5]

As disclosed on page 5 of the Specification, a time offset between a central node and a secondary node may arise because of uncoordinated system start times, intentional or accidental system restarts and/or a frequency drift during normal operation.[6] The time offset between the central node and the secondary node may be less accurate if a time wraparound occurs at the periodic counter at either the central node or the secondary node.[7]

[4] See Page 3, lines 20-23 of the Specification.
[5] See Equations (1) and (2) on Page 3 of the Specification.
[6] See Page 5, lines 13-26 of the Specification.
[7] See Page 2, lines 3-12 of the Specification.

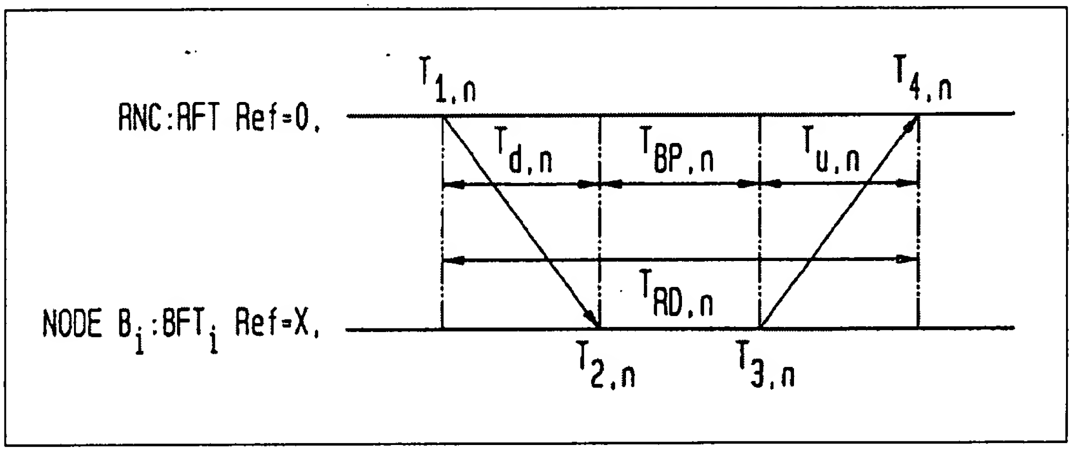

Figure 3 of the Present Invention

The method of estimating the time offset between the central node R and a secondary node B according to the claimed invention operates based on timing information measured at the central node R and the secondary node B.[8] One method for obtaining this timing information involves the sending of control frames between the central node R and the secondary node B.[9] Claims 1 and 11 each recite "receiving, at a central node, downlink and uplink timing information from a secondary node, the downlink and uplink timing information based on a periodic timing scale, the downlink timing information representing timing information for communication from the central node to the secondary node and the uplink information representing timing information for communication from the secondary node to the central node." As shown in Figure 3 (reproduced above) and described in steps S15-S30 of Figure 4A, the central node R sends a downlink (DL) node sync control frame stamped by RFT send epoch $\{T_{1,n}\}$.[10] Namely, the time $T_{1,n}$ is the local time at the central node R when the control frame is sent to the secondary node B.[11] The secondary node B receives that frame at BFT_i receive epoch $T_{2,n}$.[12] After certain secondary node B processing time T_{BP}, the secondary node B sends an uplink (UL) node sync control frame at BFT_i epoch $T_{3,n}$, where this frame is stamped by $\{T_{1,n}, T_{2,n}, T_{3,n}\}$.[13] Here, the times $T_{2,n}$ and $T_{3,n}$ are the local times measured at the secondary node B.

[8] See Page 6, lines 14-17 of the Specification.
[9] See Page 6, lines 17-18 of the Specification.
[10] See Page 6, lines 19-27 of the Specification.
[11] *Id.*
[12] *Id.*
[13] *Id.*

When the central node R receives the UL node sync frame, it records the RFT receive epoch $T_{4,n}$.[14]

Once the central node R receives each of the times $t_{1,n}$ - $t_{4,n}$, a time wraparound adjustment (e.g., a conversion from a periodic to a continuous time scale) is executed (See step S35 in Figure 4A).[15] Claim 1 recites "converting the received downlink and uplink timing information to a continuous time scale," and claim 11 recites "adjusting the received downlink and uplink timing information for time wraparound." The time wraparound adjustment performed by the central node is illustrated in detail in Figure 5 (reproduced below).

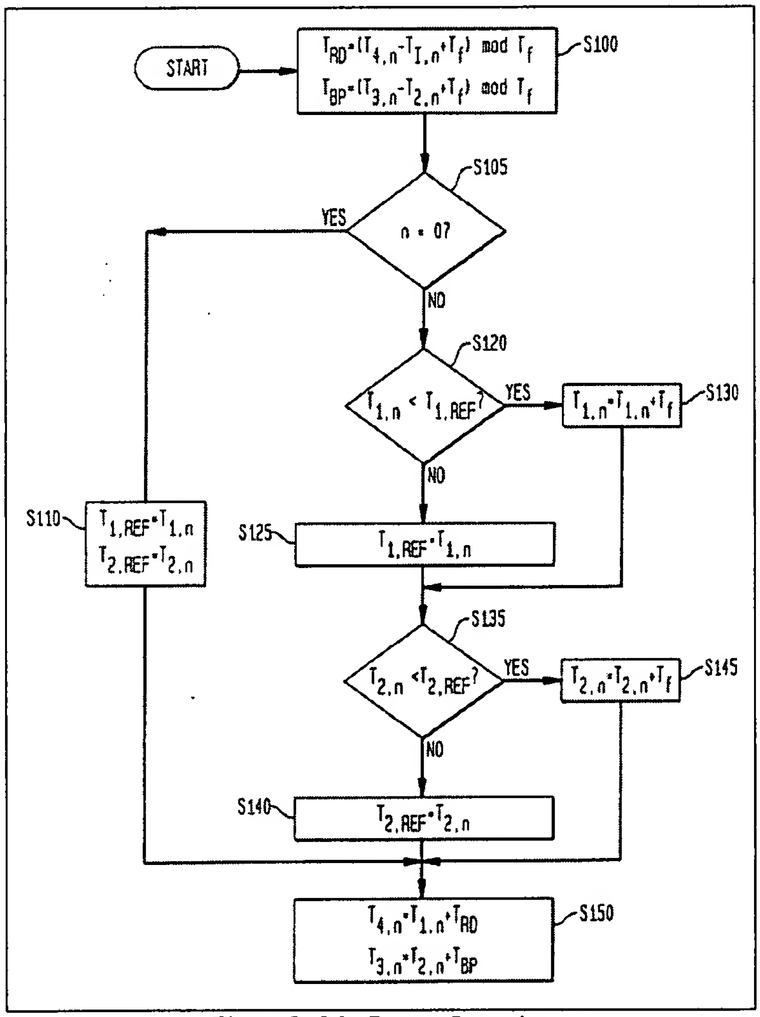

Figure 5 of the Present Invention

[14] See Page 6, lines 20-27 of the Specification.
[15] See Page 8, lines 17-19 of the Specification.

As shown in Fig. 5, in step S100, the central node R calculates the total round trip delay T_{RD} and the secondary node processing time T_{BP}, compensated for time wraparound by use of the "mod" calculation.[16] Subsequently, in step S105, the central node R determines if the timing information represents a first sample.[17] If so, then in step S110, a reference first send time $T_{1,REF}$ and a reference first receive time $T_{2,REF}$ are set equal to the first send time $T_{1,n}$ and the first receive time $T_{2,n}$, respectively.[18]

However, processing proceeds to step S120 if, in step S105, the sample count n does not equal zero.[19] In step S120, the central node R determines if the first send time $T_{1,n}$ is less than the reference first send time $T_{1,REF}$.[20] If so, then time wraparound has occurred at the central node R, and in step S130, the first send time $T_{1,n}$ is changed to $T_{1,n} + T_f$.[21] This operation converts the first send time $T_{1,n}$ from a periodic time scale to a continuous time scale.[22] If the central node R does not determine that the first send time $T_{1,n}$ is less than the reference first send time $T_{1,REF}$ in step S120, then processing proceeds to step S125.[23] In step S125, the central node R sets the reference first send time $T_{1,REF}$ equal to the first send time $T_{1,n}$.[24]

After step S130 or step S125, processing proceeds to step S135.[25] In step S135 the central node R determines if the first receive time $T_{2,n}$ is less than the reference first receive time $T_{2,REF}$.[26] If so, then time wraparound has occurred at the secondary node B, and in step S145, the first receive time $T_{2,n}$ is changed to $T_{2,n} + T_f$.[27] This operation converts the first receive time $T_{2,n}$ from a periodic time scale to a continuous time scale.[28] If the central node R does not determine that the first receive time $T_{2,n}$ is less than the reference first receive time $T_{2,REF}$ in step S135, then

---

[16] See Equations (8) and (9) on Page 7 of the Specification and Page 8, lines 19-22 of the Specification.
[17] See Page 8, lines 22-23 of the Specification.
[18] See Page 8, lines 23-25 of the Specification.
[19] See Page 8, lines 26-27 of the Specification.
[20] See Page 8, lines 27-28 of the Specification.
[21] See Page 8, lines 28-29 of the Specification.
[22] See Page 8, lines 29-31 of the Specification.
[23] See Page 8, lines 31-32 of the Specification.
[24] See Page 8, line 32 to Page 9, line 2 of the Specification.
[25] See Page 9, line 3 of the Specification.
[26] See Page 9, lines 3-5 of the Specification.
[27] See Page 9, lines 5-6 of the Specification.
[28] See Page 9, lines 6-7 of the Specification.

processing proceeds to step S140.[29] In step S140, the central node R sets the reference first receive time $T_{2,REF}$ equal to the first send time $T_{2,n}$.[30]

After step S140 or step S145, processing proceeds to step S150.[31] In step S150, the second receive time $T_{4,n}$ is set equal to the first send time $T_{1,n}$ plus the total round-trip delay T_{RD} and the second send time $T_{3,n}$ is set equal to the first receive time $T_{2,n}$ plus the secondary node processing time T_{BP}.[32] Because the first send time $T_{1,n}$ and the first receive time $T_{2,n}$ have been compensated for time wraparound, setting the second send time $T_{3,n}$ and the second receive time $T_{4,n}$ in this manner likewise compensates for time wraparound.[33]

After the time wraparound adjustment, as above-described with respect to Figure 5 is executed, uplink $T_{u,n}$ and downlink $T_{u,n}$ delay indicators are determined according to steps S40-S55 in Figure 4A as shown by equations (10) and (11) reproduced below:

$$\tau_{D,n} = (T_{2,n} - T_{1,n}) = T_{D,n} + X_i \qquad (10)$$

$$\tau_{U,n} = (T_{4,n} - T_{3,n}) = T_{U,n} - X_i \qquad (11)$$

where x_i represents the time offset.[34] Claim 1 recites "determining, only after the converting step, a time offset estimate between the central node and the secondary node based on the converted downlink and uplink timing information," and claim 11 recites "determining, only after the adjusting step, a time offset estimate between the central node and the secondary node based on the adjusted downlink and uplink timing information."

After having obtained a number of uplink and downlink delay indicator samples (see step S50 in Figure 4B which requires N samples before proceeding)[35], a minimum of each of the uplink and downlink delay indicators is determined in step S55 of Figure 4B.[36] Then , the time offset X_i is determined according to equation 13 below in step S60 of Figure 4B:

[29] See Page 9, lines 7-9 of the Specification.
[30] See Page 9, lines 9-11 of the Specification.
[31] See Page 9, line 12 of the Specification.
[32] See Page 9, lines 12-15 of the Specification.
[33] See Page 9, lines 15-18 of the Specification.
[34] See Page 9, lines 19-23 of the Specification and equations (10) and (11) on page 7 of the Specification.
[35] See Page 9, lines 22-25 of the Specification.
[36] See Page 9, lines 25-27 of the Specification.

$$\hat{X}_i = \frac{1}{2}\left[\tau_{D,\min} - \tau_{U,\min}\right] \quad , \qquad \{\text{adjusted within } [-T_f/2, T_f/2) \qquad (13)$$ [37]

VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

Appellants seek the Board's review of the rejection of claims 1-4 and 7 under 35 U.S.C. § 102 (b) as being anticipated by Premerlani, claim 11 under 35 U.S.C. § 103 (a) as being unpatentable over Premerlani, and claims 5-6 and 8-10 under 35 U.S.C. § 103 (a) as being unpatentable over Premerlani in view of Thornberg.

VII. ARGUMENTS

A. Appellants traverse the rejection of claims 1-4 and 7 under 35 U.S.C. § 102(b) as being anticipated by Premerlani.

Claim 1 is argued below with claims 1-4 and 7 rising and falling together.

i) Claim 1

In the final Office Action dated March 2, 2007, the Examiner relies substantially upon column 6, lines 14-34 of Premerlani in rejecting independent claim 1.[38] In the cited section, Premerlani discusses round trip delay. Premerlani discloses that round trip delay may be calculated by subtracting the measured delay between a first terminal and a second terminal from the measured delay between the second terminal and the first terminal.[39] The clock offset is determined by adding the two delays between the first and second terminals and dividing by two.[40] Premerlani states that "the clock offset can be positive or negative if time stamps are unsigned numbers that wrap around".[41] Premerlani discloses that if a rollover or wraparound of any one of the time stamps occurs, a predetermined number may either be added or subtracted

[37] See Page 9, line 27 – Page 10, line 5 of the Specification.
[38] See Pages 2-4 of the March 2, 2007 Final Office Action.
[39] See Column 6, lines 13-34 of Premerlani.
[40] *Id.*
[41] *Id.*

to/from the round trip delay and one-half the predetermined number may either be added or subtracted to/from the clock offset.[42]

Thus, Premelani teaches determining a clock offset based on two measured delays, and only subsequently compensating for time wraparound by adjusting the clock offset by one-half of a pre-determined number.

Independent claim 1 recites "converting the received downlink and uplink timing information to a continuous time scale". Premerlani does not explicitly disclose converting the received downlink and uplink timing information to a continuous time scale. Rather, the Examiner alleges that this feature is equivalent to the above discussed teaching in Premerlani concerning compensating for time wraparound by subtracting or adding a predetermined number from the roundtrip delay.[43] The roundtrip delay is calculated using unconverted downlink and uplink timing values after determining the clock offset.[44] If Premerlani were to convert the received downlink and uplink timing information into a continuous time scale before determining the clock offset, no adjustment to the round trip delay would be necessary.

Independent claim 1 further recites "determining, <u>only after the converting step</u>, a time offset estimate between the central node and the secondary node based on the converted downlink and uplink timing information". Since independent claim 1 recites that the time offset estimate is determined only after the converting step, the time offset estimate does not require the above-described adjustment with the predetermined number of Premerlani.

As discussed above, the predetermined number in Premerlani may either be subtracted or added to the final calculated round trip delay or the clock offset, which indicates that the downlink and uplink timing information (the respective measured delays between the first and second terminals) is performed <u>after</u> the determination of the round trip delay and the clock offset. In contrast, independent claim 1 recites "determining, only after the converting step, a time offset..." Thus, according to the claimed invention, no subtraction to compensate for time wraparound would be executed on the determined time offset estimate because the uplink and

---

[42] *Id.*
[43] *Id.*
[44] *Id.*

downlink timing information, used to calculate the time offset estimate, is already in the continuous time domain.

Therefore, Appellants respectfully submit that Premerlani cannot disclose or suggest determining time offset "only after the converting step… based on the converted downlink and uplink timing information" as recited in independent claim 1. Rather, Premerlani discloses calculating the round trip delay and the clock offset with periodic time stamps and then performing a compensation for rollover.

In the decision on the prior Appeal 2006-2544, the Appeals Board took the position that the claims (as they stood at the time) could read upon Premerlani because the temporal relationship was not explicitly claimed.[45] The Examiner appears to agree with this interpretation of the Appeals Board's position by stating that "The Appeals Board's decision implied that the compensation for wraparound does not have to be performed explicitly on the downlink and uplink timing information before determining the time offset and instead can be performed during a later step as is done in Premerlani".[46]

Accordingly, to overcome the Appeals Board's particular reading of the claims in this circumstance, Appellants amended independent claim 1 to explicitly indicate the order in which the determining step and converting step are performed. As it currently stands, independent claim 1 recites "determining, <u>only after the converting step</u>, a time offset estimate…"

Further, as both the Examiner and the prior Appeals Board's decision appear to agree that the timestamp wrap-around compensation of Premerlani is performed only after the round-trip calculation, Appellants respectfully submit that independent claim 1 as presently recited sufficiently distinguishes from Premerlani.

As demonstrated above, independent claim 1 is not anticipated or rendered obvious to one skilled in the art by Premerlani.

---

[45] See Pages 4-5 of the Decision on Appeal for Appeal No. 2006-2544.
[46] See Page 2 of the March 2, 2007 Final Office Action.

B. Appellants traverse the rejection of claim 11 under 35 U.S.C. § 103(a) as being unpatentable over Premerlani.

i) Claim 11

For similar reasons as discussed above with reference to claim 1, to overcome the Appeals Board's particular reading of the claims in this circumstance, Appellants have amended independent claim 11 to explicitly indicate the order in which the determining step and adjusting step are performed. As it currently stands, independent claim 11 recites "determining, only after the adjusting step, a time offset estimate…".

The Examiner appears to agree that the timestamp wrap-around compensation of Premerlani is performed only after the round-trip and time offset calculation, and acknowledges that Premerlani does not explicitly teach all the features of claim 11. However, the Examiner alleges that adjusting received downlink and uplink timing information and only subsequently determining a time offset would have been obvious to one of ordinary skill in the art.[47] Appellants disagree.

As discussed above with respect to independent claim 1, Premerlani discloses calculating the round trip delay and the clock offset using only periodic time stamps.[48] After the round trip delay and the clock offset are calculated, Premerlani discloses adjusting the round trip delay for time wraparound, not the downlink and uplink timing information.[49] Because claim 11 explicitly requires that the adjusting step be performed before the determining step, the received downlink and uplink timing information themselves are adjusted, as the clock offset has not yet been calculated. Appellants therefore submit that any ambiguities in the claim language that may have prompted the prior Appeal's Board to reject claim 11 in view of Premlerlani have been appropriately addressed.[50]

Thus, Premerlani cannot disclose or suggest "adjusting the received downlink and uplink timing information for time wraparound" as recited in independent claim 11. Likewise, it follows that Premerlani cannot disclose or suggest determining a time offset estimate "only after the adjusting step… based on the adjusted downlink and uplink timing information" as recited in

---

[47] See Pages 7-9 of the Final Office Action dated March 2, 2007.
[48] See Column 6, lines 13-34 of Premerlani.
[49] *Id.*
[50] See Page 6 of the Decision on Appeal for Appeal No. 2006-2544.

independent claim 11. Rather, as discussed above with respect to independent claim 1, it appears that the disclosure of Premerlani teaches calculating the round trip delay and the clock offset using only time stamps unadjusted for time wraparound and only subsequently executing a compensation for a time wraparound adjustment to the calculated round trip delay.

As demonstrated above, independent claim 11 is not anticipated or rendered obvious to one skilled in the art by Premerlani.

C. Appellants Traverse the Rejection of Claims 5-6 and 8-10 under 35 U.S.C. §103 (a) as being unpatentable over Premerlani in view of Thornberg

As discussed above, Premerlani does not anticipate or render claim 1 as obvious to one skilled in the art. However, the Examiner alleges that "Thornberg teaches calculating a plurality of uplink and downlink delays in order to find an average uplink and downlink delay".[51]

Thornberg discloses a method of packet switched radio channel traffic supervision.[52] Thornberg relates to estimating either the uplink or the downlink average data packet delays in a communications network.[53] Thornberg, however, discloses nothing related to converting the periodic delay into a continuous time scale.[54] Thus, even if the Examiner is correct in that "Thornberg teaches calculating a plurality of uplink and downlink delays in order to find an average uplink and downlink delay", Appellants respectfully submit that Thornberg is similarly deficient as is Premerlani as discussed above with respect to independent claim 1.[55] Therefore, Premerlani in view of Thornberg cannot render claim 1 as obvious to one skilled in the art.

As such, claims 5-6 and 8-10, dependent upon independent claim 1 are likewise allowable over the Premerlani in view of Thornberg at least for the reasons given above with respect to independent claim.

[51] See pages 9-10 of the March 2, 2007 Final Office Action.
[52] See Abstract of Thornberg.
[53] *Id.*
[54] *Id.*
[55] See pages -10 of the March 2, 2007 Final Office Action.

VIII. CONCLUSION

Appellants respectfully request the Board to reverse the Examiner's anticipation and/or obviousness rejection of claims 1-11.

Because a Final Board decision has not been made on the prior appeal, no additional fee for filing a Notice of Appeal is believed due in accordance with MPEP 1204.01.

The Commissioner is authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 08-0750 for any additional fees required under 37 C.F.R. § 1.16 or under 37 C.F.R. § 1.17; particularly, extension of time fees.

Respectfully submitted,

HARNESS, DICKEY, & PIERCE, P.L.C.

By: ____________________

Gary D. Yacura, Reg. No. 35,416
P.O. Box 8910
Reston, Virginia 20195
(703) 668-8000

GDY/SAD:ald

IX. CLAIMS APPENDIX

Claims 1-11 on Appeal

1. A method of determining a time offset estimate between a central node and a secondary node, comprising:

receiving, at a central node, downlink and uplink timing information from a secondary node, the downlink and uplink timing information based on a periodic timing scale, the downlink timing information representing timing information for communication from the central node to the secondary node and the uplink information representing timing information for communication from the secondary node to the central node;

converting the received downlink and uplink timing information to a continuous time scale; and

determining, only after the converting step, a time offset estimate between the central node and the secondary node based on the converted downlink and uplink timing information.

2. The method of claim 1, wherein the downlink information includes a first time measured at the central node of sending a downlink frame to the secondary node and a second time measured at the secondary node of receiving the downlink frame, and the uplink information includes a third time measured at the secondary node of sending an uplink frame.

3. The method of claim 2, further comprising:

measuring, at the central node, a fourth time of receiving the uplink frame; and wherein

the converting step converts the first, second, third and fourth times to a continuous time scale.

4. The method of claim 3, wherein the determining step comprises:

determining uplink and downlink delay indicators based on the converted first, second, third and fourth times; and

calculating the time offset estimate based on the uplink and downlink delay indicators.

5. The method of claim 4, wherein

the determining uplink and downlink delay indicators step is performed for a plurality of first, second, third and fourth time sets; and

the calculating step calculates the time offset estimate based on the plurality of uplink and downlink delay indicators.

6. The method of claim 5, wherein the calculating step comprises:

determining a minimum uplink delay indicator and a minimum downlink delay indicator from the plurality of uplink and downlink delay indicators; and

calculating the time offset estimate based on the minimum downlink delay indicator and the minimum uplink delay indicator.

7. The method of claim 1, further comprising:

sending a downlink frame to the secondary node, the downlink frame including a first time measured at the central node indicating when the downlink frame is sent; and wherein

the receiving step receives an uplink frame at the central node, the uplink frame includes the first time, a second time measured at the secondary node of receiving the downlink frame, a third time measured at the secondary node of sending the uplink frame.

8. The method of claim 1, further comprising:

setting a timer at a start of the method; and

stopping the method if the timer times out.

9. The method of claim 1, further comprising:

compensating the time offset estimate for DC bias errors.

10. The method of claim 1, wherein the central node is a radio network controller.

11. A method of determining a time offset estimate between a central node and a secondary node, comprising:

receiving, at a central node, downlink and uplink timing information from a secondary node, the downlink and uplink timing information based on a periodic timing scale, the downlink timing information representing timing information for communication from the central node to the secondary node and the uplink information representing timing information for communication from the secondary node to the central node;

adjusting the received downlink and uplink timing information for time wraparound; and

determining, only after the adjusting step, a time offset estimate between the central node and the secondary node based on the adjusted downlink and uplink timing information.

X. EVIDENCE APPENDIX

No evidence has been submitted pursuant to §§ 1.130, 1.131, or 1.132 of this title, nor has any other evidence been entered by the examiner and relied upon by appellant in the appeal. As such, Appellants have omitted the Evidence appendix under 37 C.F.R. § 41.37(c)(1)(ix).

The opinion in support of the decision being entered today was <u>not</u> written for publication and is <u>not</u> binding precedent of the Board.

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

<u>Ex parte</u> HISHAM S. ABDEL-GHAFFAR

Appeal No. 2006-2544
Application No. 09/764,072

ON BRIEF

Before THOMAS, BLANKENSHIP, and MACDONALD, <u>Administrative Patent Judges</u>.

BLANKENSHIP, <u>Administrative Patent Judge</u>.

<u>DECISION ON APPEAL</u>

This is a decision on appeal under 35 U.S.C. § 134 from the examiner's final rejection of claims 1-10.

We affirm, and enter new grounds of rejection in accordance with 37 CFR § 41.50(b).

BACKGROUND

The invention relates to a method of determining a time offset estimate between a central node and a secondary node; particularly, where the nodes have periodic local timing. (Spec. at 1.) Representative claim 1 is reproduced below.

> 1. A method of determining a time offset estimate between a central node and a secondary node, comprising:
>
> receiving, at a central node, downlink and uplink timing information from a secondary node, the downlink and uplink timing information based on a periodic timing scale, the downlink timing information representing timing information for communication from the central node to the secondary node and the uplink information representing timing information for communication from the secondary node to the central node;
>
> converting the received downlink and uplink timing information to a continuous time scale; and
>
> determining a time offset estimate between the central node and the secondary node based on the converted downlink and uplink timing information.

The examiner relies on the following references:

Thornberg et al. (Thornberg)	5,757,772	May 26, 1998
Premerlani	5,958,060	Sep. 28, 1999

We refer to the Final Rejection (mailed Dec. 15, 2004) and the Examiner's Answer (mailed Oct. 4, 2005) for a statement of the examiner's position and to the Brief (filed Aug. 23, 2006) and the Reply Brief (filed Dec. 5, 2005) for appellant's position with respect to the claims which stand rejected.

Claims 1-4 and 7 stand rejected under 35 U.S.C. § 102 as being anticipated by Premerlani.

Claims 5, 6, and 8-10 stand rejected under 35 U.S.C. § 103 as being unpatentable over Premerlani and Thornberg.

The examiner has withdrawn a rejection against claim 11 as being anticipated (§ 102) by Premerlani. (Answer at 2.)

OPINION

The rejections

The examiner finds instant claim 1 to be anticipated by Premerlani. The reference is directed to clock synchronization and control. The rejection relies in particular on Premerlani's description, in columns 5 and 6, of four time stamps for calculating round trip delay time between nodes and using the information to determine clock offset between nodes.

Appellant acknowledges Premerlani's teaching that if rollover or wraparound of any of the time stamps occurs, then a predetermined number may be added to or subtracted from the round trip delay and one half of the number can be added to or subtracted from the clock offset. (Brief at 8.) According to appellant, Premerlani does not disclose converting the received downlink and uplink timing information to a continuous time scale. In appellant's view, Premerlani calculates round trip delay using "unconverted" downlink and uplink timing values. (Id.) Because Premerlani is deemed to not disclose converting the received downlink and uplink timing information to a continuous scale, the reference cannot describe determining a time offset between the

nodes "based on the converted downlink and uplink timing information" as required by instant claim 1. (Id. at 8-9.)

Appellant's specification, in material bridging pages 8 and 9 (and at Fig. 5), provides examples of converting time stamps from a periodic to a continuous time scale. For example, if $T_{1,n}$ is determined to be inaccurate due to time wraparound, T_f is added to the value. T_f is the overall system period for all associated nodes. (Spec. at 3; Fig. 2.)

Premerlani describes determining round trip delay between two terminals by subtracting a first and a second set of four time stamps. The clock offset can be calculated by adding the two delays between the terminals and dividing by two. The time stamps may, however, be unsigned numbers that wrap around. To compensate for roll over of particular time stamps, a predetermined number can be subtracted from the round trip delay and one half of the value can be subtracted from the clock offset, or the predetermined number can be added to the round trip delay and one half of the value can be added to the clock offset. The "predetermined number" is selected as the number of counts before which the clock rolls over. Premerlani col. 6, ll. 13-36.

Appellant's system converts timing information to "a continuous time scale" by adding a predetermined number (T_f) to a time stamp value in the event of wraparound with respect to the periodic timing scale. The Premerlani system converts the received downlink and uplink timing information to a continuous time scale, within the meaning of instant claim 1, for the purpose of compensating for wraparound in the time stamp

values. The Premerlani system would be inoperative if the wraparound were not so compensated. The claimed "converting the received downlink and uplink timing information to a continuous time scale" does not require the specifics of the disclosed examples of operating on time stamp values individually, but is sufficiently broad to read on the operations described by Premerlani. Our reviewing court has repeatedly warned against confining the claims to specific embodiments described in the specification. Phillips v. AWH Corp., 415 F.3d 1303, 1323, 75 USPQ2d 1321, 1334 (Fed. Cir. 2005) (en banc).

Premerlani thus supports the examiner's finding of anticipation, and we sustain the rejection of claim 1. Claims 2-4 and 7, not separately argued by appellant, fall with claim 1. See 37 CFR § 41.37(c)(1)(vii) (2006).

Nor do appellant's arguments in response to the § 103 rejection of claims 5, 6, and 8-10 persuade us of error. Appellant relies on the supposed deficiencies in Premerlani as applied against base claim 1. (Brief at 10.) We therefore sustain the rejection of claims 5, 6, and 8-10.

New ground of rejection

We enter the following new ground of rejection against the claims in accordance with 37 CFR § 41.50(b): Claim 11 is rejected under 35 U.S.C. § 102(b) as being anticipated by Premerlani.

Claim 11 was rejected under § 102 over Premerlani in the Final Rejection. However, the rejection was withdrawn in the Answer. We therefore designate the rejection of claim 11 as a new ground of rejection.

Instant claim 11 is similar to claim 1. The language of claim 11 differs in the steps of "adjusting the received downlink and uplink timing information for time wraparound," and determining a time offset estimate "based on the adjusted downlink and uplink timing information."

We find that Premerlani adjusts the received downlink and uplink timing information for time wraparound and determines the time offset estimate based on the adjusted downlink and uplink timing information for the reasons in our discussion (supra) of the reference as applied against claim 1. Further, similar to claim 1, we do not consider claim 11 to require the disclosed specifics of operating directly on individual time stamp values, but broad enough to read on the operations described by Premerlani. We thus reject the claim under § 102.

CONCLUSION

The rejection of claims 1-10 is affirmed.

A new rejection of claim 11 under 35 U.S.C. § 102(b) is set forth herein.

This decision contains a new ground of rejection pursuant to 37 CFR § 41.50(b) (2006). 37 CFR § 41.50(b) provides "[a] new ground of rejection pursuant to this paragraph shall not be considered final for judicial review."

Appeal No. 2006-2544
Application No. 09/764,072

37 CFR § 41.50(b) also provides that the appellant, WITHIN TWO MONTHS FROM THE DATE OF THE DECISION, must exercise one of the following two options with respect to the new ground of rejection to avoid termination of the appeal as to the rejected claims:

> (1) *Reopen prosecution.* Submit an appropriate amendment of the claims so rejected or new evidence relating to the claims so rejected, or both, and have the matter reconsidered by the examiner, in which event the proceeding will be remanded to the examiner. . . .
>
> (2) *Request rehearing.* Request that the proceeding be reheard under § 41.52 by the Board upon the same record. . . .

Appeal No. 2006-2544
Application No. 09/764,072

No time period for taking any subsequent action in connection with this appeal may be extended under 37 CFR § 1.136(a). See 37 CFR § 1.136(a)(1)(iv).

AFFIRMED – 37 CFR § 41.50(b)

JAMES D. THOMAS Administrative Patent Judge	
HOWARD B. BLANKENSHIP Administrative Patent Judge	BOARD OF PATENT APPEALS AND INTERFERENCES
ALLEN R. MACDONALD Administrative Patent Judge	

XI. RELATED PROCEEDINGS APPENDIX

Appeal No. 2006-2544
Application No. 09/764,072

HARNESS, DICKEY & PIERCE, P.L.C.
P.O. BOX 8910
RESTON, VA 20195